JPL and the NASA Office of Exploration Systems

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Exploration Systems and Technology Office

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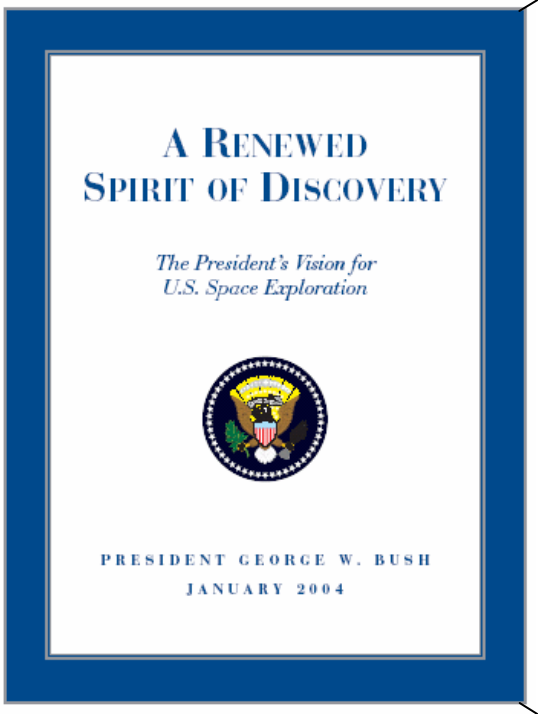
Topics

- Background
- OExS relationship to NASA Centers
- OExS themes (an interpretation)

Nation's Vision for Space Exploration

THE FUNDAMENTAL GOAL OF THIS VISION IS TO ADVANCE U.S. SCIENTIFIC, SECURITY, AND ECONOMIC INTEREST THROUGH A ROBUST SPACE EXPLORATION PROGRAM



Implement a sustained and affordable human and robotic program to explore the solar system and beyond

Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations;

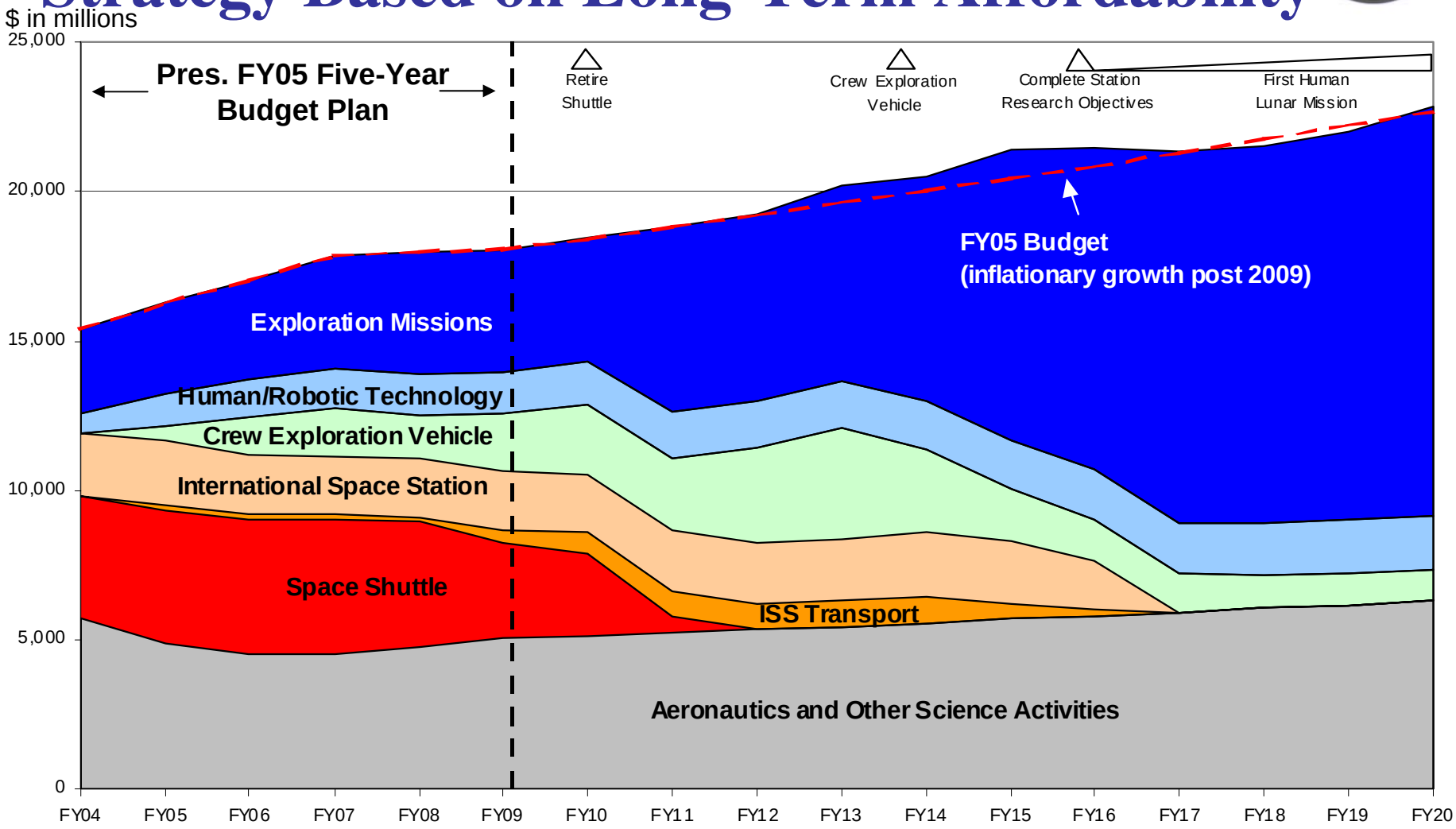
Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration; and

Promote international and commercial participation in exploration to further U.S. scientific, security, and economic interests.

Key Elements of the Nation's Vision

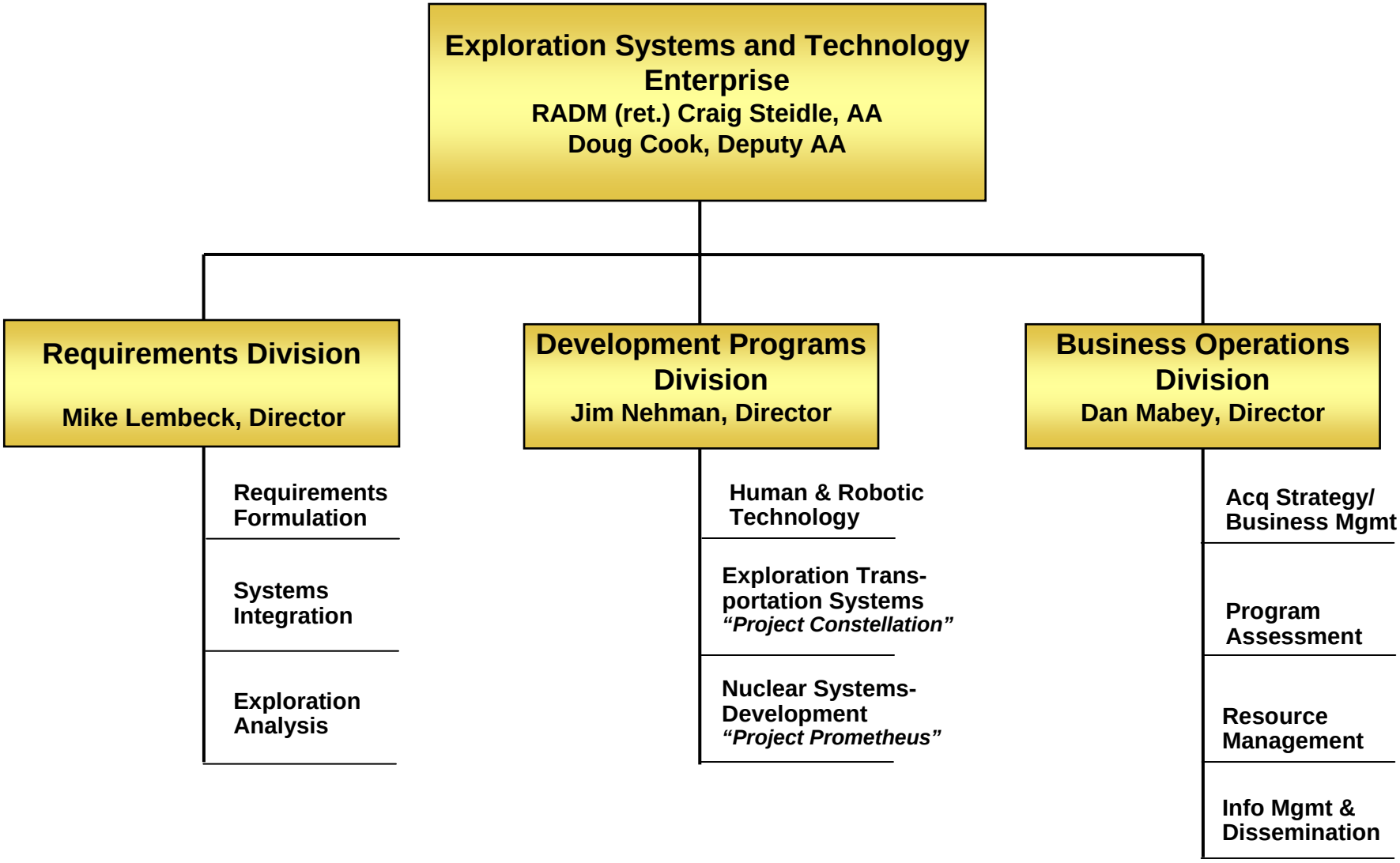
- **Major Milestones**
  - 2008: Initial flight test of CEV
  - 2008: Launch first lunar robotic orbiter
  - 2009-2010: Robotic mission to lunar surface
  - 2011 First Unmanned CEV flight
  - 2014: First crewed CEV flight
  - 2012-2015: Jupiter Icy Moon Orbiter (JIMO)/Prometheus
  - 2015-2020: First human mission to the Moon

Strategy Based on Long-Term Affordability

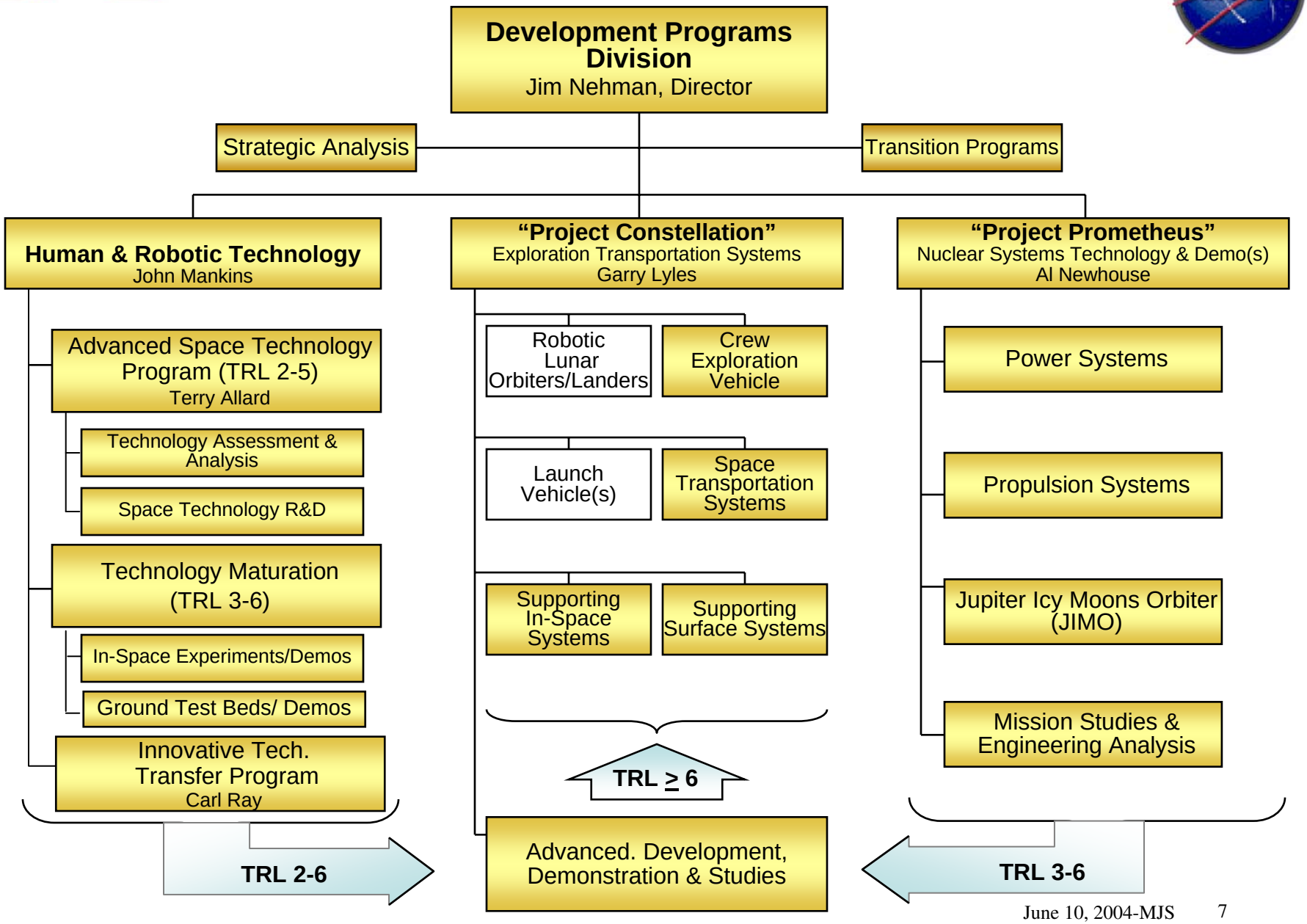


NOTE: Exploration missions – Robotic and eventual human missions to Moon, Mars, and beyond
Human/Robotic Technology – Technologies to enable development of exploration space systems
Crew Exploration Vehicle – Transportation vehicle for human explorers
ISS Transport – US and foreign launch systems to support Space Station needs especially after Shuttle retirement

Office of Exploration Systems Organization (OExS



Development Programs Division



Development

Major Elements

Project Constellation

- Development of a Crew Exploration Vehicle and related elements

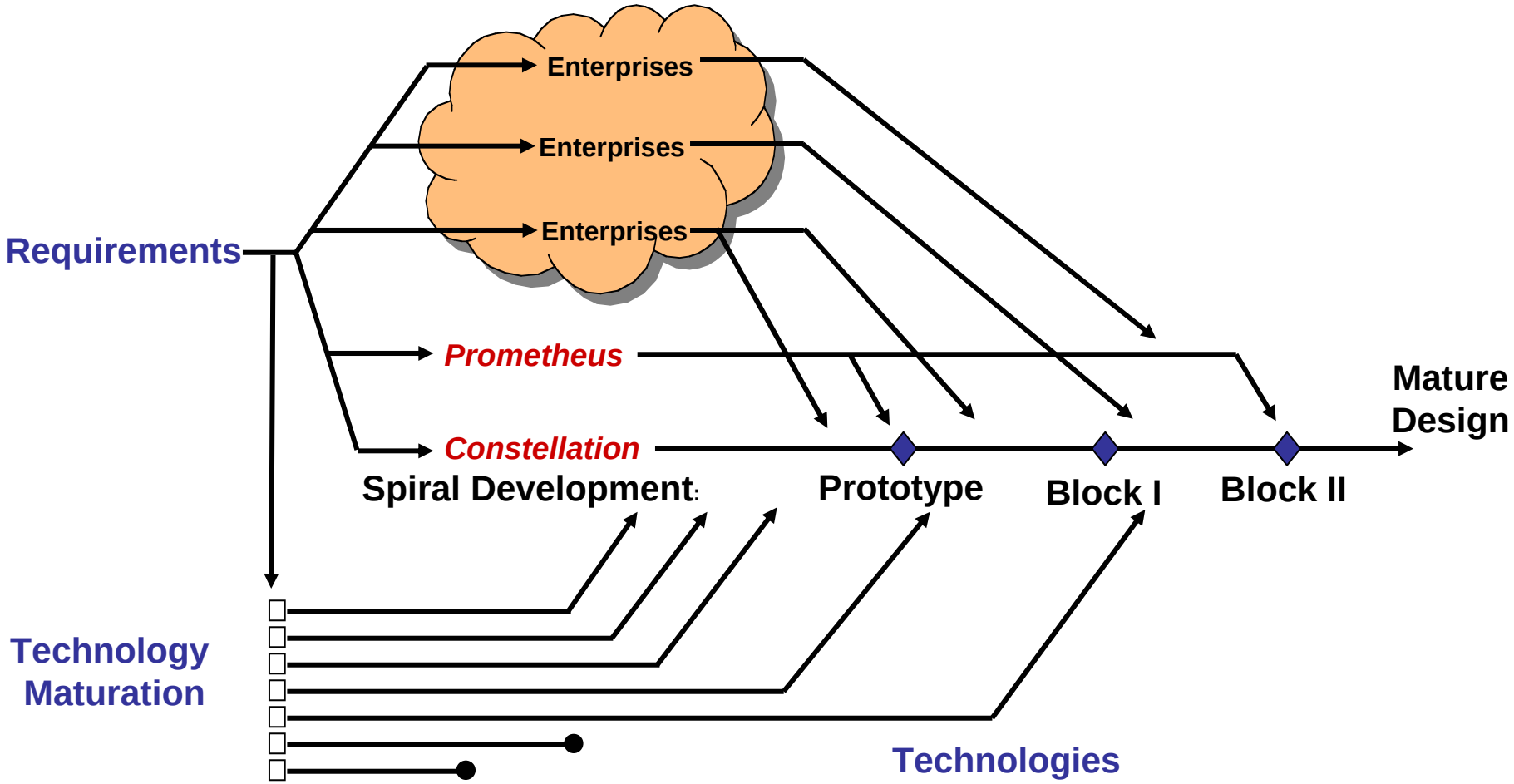
- **Project Prometheus**
  - The Nuclear Systems Program including JIMO

- **Advanced Space Technology**
  - Advance and mature a range of novel concepts and high-leverage technologies and transition them to application in the Exploration Systems Enterprise and other NASA Enterprises…

- **Technology Maturation**
  - Develop and validate novel concepts and high-leverage technologies to enable safe, affordable, effective and sustainable human and robotic exploration…

- **Innovative Technology Transfer Partnerships**
  - Enable the creative use of intellectual assets both inside and outside NASA to meet Agency needs and to benefit the Nation…

Requirements and Technology Investment Flow



Exploration Systems: Building on Past Findings and Lessons Learned

- **Packard Commission Findings**
  - Get operators and technologists together to enable the leveraging of cost-performance trades
  - Apply technology to lower cost of system, not just to increase its performance
  - Mature technology prior to entering engineering and systems development
  - Partnerships with Industry to identify innovative solutions

- **Report of the DSB/AFSAB (Young Report)**
  - Requirements definition and control are dominant drivers of cost, schedule, and risk in space systems development programs

OExS Key Themes (An Interpretation)

- Industry builds the human flight articles
- All technology gets competed and infused to industry
- Decisions are HQ focused/top down process
- T sponsored technology is Vision centered/ Other codes tend to their unique needs
- Spiral development
- Meticulous requirements management
    - Packard Commission/Young report lessons
- Centers-Near term
    - Brief studies/trades and a source of workforce
- Centers-Longer term
    - Next chart
- OExS' job is to change how NASA does work
- OExS is an "acquisition organization"
- Simulation based acquisition
- Lean government organization

Exploration Systems and Technology Office (ESTO)

Interim Organizational Structure

Rev 1

Michael Sander, Manager
Office 190
Nancy Schweiner
Administrative Assistant

Budget Tracking
J. Selders
2525

Jim Lesh 970	Tim Krabach 650	Satish Khanna 660	John Hong 710	Rich Doyle 980	Steve Prusha 133	Garry Burdick 690	Andrew Gerber 820
• Space Communications Technology	• Sensors & Instruments (E. Kolawa)	• Power (R. Surampudi)	• Large Telescopes (J. Dooley)	• Intelligent Systems (B. Smith)	• System and Investment Analysis (C. Weisbin)	• Prometheus Technology	• Commercial Programs (D. Wiberg)
	• Bio/ Nano Technology (B. Toomarian)	• Propulsion (R. Reeve)	• Formation Flying (F. Hadeagh)	• Advanced Computing (L. Bergman)	• Engineering and Design Tools and Methods (S. Wall)	• Requirements	• SBIR/STTR •(W. Schoeber)
		• Robotics (B. Wilcox)		• Revolutionary Computing (TBD)	• Risk Modeling and Tools (S. Cornford)		
		• Micro/ Nano Science Craft (L. Alkalai)		• Flight Software Systems (K. Meyer)	• Model Based Design (S. Wall)		
		• Extreme Environments (E.Kolawa)					

OExS Views On Center Roles (An Interpretation)

- Few analogues in the Navy acquisition world for NASA centers
- OExS is reviewing NASA centers
  - Recognize center to center differences
  - View centers as "competencies"
  - Will be using a new Agency "competency matrix" to assign work
    - Still a work in progress
- Center roles discussed so far:
  - Provide staff for HQ
  - Provide technical experts for contractor selection process
  - Provide technical experts for insight/oversight
  - Participate in the technology program
  - Possibly be project managers for specific Constellation elements
  - Provide contract management for extramural technology tasks
- Major emphasis on "lean" staffing by gov't
- Major emphasis on top down HQ led management process
  - All key decisions at HQ
  - Center authority will be very narrowly defined and constrained

Take Away Points

This is not business as usual.

- Think of OExS as a mega program office

Relevance is no longer just a buzz word.

Partnering is key

Very long term R and D is not likely to have a huge NASA investment

- Major infusion opportunity for 2011 CEV and following flight products

Take Away Points

- OExS has come a long way in a short time
  - Staffed, organized, developed an energetic culture, doing real work
- Very focused on key milestones
- Very disciplined, requirements driven, focus on HQ centered decision process
- Learning organization
  - Significant “bring in” of DOD experience, leveraging of NASA lessons learned and past success models (Apollo/Joint Strike Fighter)
- Deep appreciation of “system of systems”, technology supporting the product stream, spiral development
- Industry will build the human flight articles
  - Technology investments need to transition to industry developers
- Focus on a lean government cadre (everywhere)